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EXAMINER	
WILLIAMS, LAWRENCE B	

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/613,355

Applicant(s)

SAED ET AL.

Examiner

Lawrence B. Williams

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed 16 February 2007 have been fully considered but they are not persuasive. Applicant argues that Faulkner is silent concerning the characteristics of any signal at the output of the D/A block in his Fig. 2 and related description. The examiner respectfully disagrees. Faulkner et al. teaches the CRISIS block correcting for differential gain and differential phase (pg. 323, col. 2, lines 43-45) prior to D/A conversion. Therefore the signal at the D/A would have the characteristics as output from the CRISIS block. Applicant also argues that Faulkner et al. provides no amplification of component signal in the system depicted in Fig. 2. Again the examiner respectfully disagrees. Faulkner et al teaches the RF section consisting of "appropriate preamplifiers, and the NPLA". Thus there is amplification of the component signals. Therefore, applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the examiner's cited arguments and new ground(s) of rejection.

### ***Drawings***

2. The drawings were received on 16 February 2007. These drawings are accepted by the examiner.

### ***Claim Objections***

3. Claim 14 is objected to because of the following informalities: Claim 14 cites "prior to step (d). Applicant has eliminated the (a)-(d), therefore there is no longer a step (d). Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-3, 5-6, 9-11, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Faulkner et al. (Adaptive Linearization Using Predistortion- Experimental Results).

(1) With regard to claim 1, Faulkner et al. discloses in Fig. 2, a system for processing an input signal (m), the system comprising: a predistortion subsystem ( $H_R$ ,  $H_\theta$ , adapt) adapted to receive said input signal and adapted to produce a predistorted signal by applying a deliberate predistortion to said input signal, wherein said predistortion subsystem is adapted to distort said input signal to compensate for distortions in a system output signal (pg. 324, col. 1, lines 9-11); and a signal processing subsystem (RF section; pg. 323, col. 2, line 46- pg. 324, col. 1, line 2), adapted to receive and process said predistorted signal and adapted to produce a system output signal, said signal processing subsystem is adapted to decompose said predistorted signal into separate components, each of said separate components being processed separately (RF section shows signal (m) decomposed into two signal components with individual processing); and said processing subsystem is adapted to combine (combiner,  $\oplus$ ) said components after processing to produce said system output signal; wherein said signal processing subsystem comprises: a signal decomposer (Crisis Block/D/A) adapted to decompose said predistorted signal into at least two components, each of the at least two components exhibiting a phase and a magnitude, the

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magnitude of at least two of the at least two component signals being substantially equal

Faulkner et al. teaches the Crisis network correcting for differential gain (magnitude) and differential phase (pg. 323, II. Adaptive Baseband Predistortion, lines 43-45). Thus, the correction of differential gain (magnitude) and phase would imply the signal components exhibiting a phase and magnitude and after correction, the magnitude (gain) of the two signal components would be substantially equal; at least two signal component processor blocks (filtering and amplification, s, c), each of said at least two signal component processor blocks including an amplifier (s, c, in Fig. 2; pg. 324, col. 1, lines 1-2) each signal processor block adapted to receive an output from said signal decomposer and each signal processor block adapted to separately process said output received from said signal decomposer (shown in Fig. 2); and a combiner (combiner,  $\oplus$ ) adapted to receive a processed output from each of said at least two signal component processor blocks, said combiner producing said system output signal from said processed outputs of said at least two signal component processor blocks.

(2) With regard to claim 2, Faulkner et al. also discloses in Fig. 2, a system according to claim 1 wherein said signal processing subsystem comprises: a signal decomposer (Crisis, D/A) for decomposing said predistorted signal into at least two components (as shown in Fig. 2, the Crisis, D/A serve to decompose the predistorted signal into at least two components); at least two signal component processor blocks (filter and amplifier block s; filter and amplifier block c) each signal processor block receiving an output of said signal decomposer and each signal processor block separately processes said output received from said signal decomposer; and a combiner ( $\oplus$ ) receiving a processed output from each of said at least two signal component processor

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blocks, said combiner producing said system output signal from said processed outputs of said at least two signal component processor blocks.

(3) With regard to claim 3, Faulkner et al. also discloses a system according to claim 2 wherein at least one of said at least two signal component processor blocks includes an amplifier (pg. 323, col. 2, line 46 - pg. 324, col. 1, line 2).

(4) With regard to claim 5, Faulkner et al. also discloses a system according to claim 1 wherein said system is part of a signal transmission system (pg. 323, col. 1, line 1).

(5) With regard to claim 9, Faulkner et al. also discloses a system according to claim 1 wherein said deliberate predistortion includes magnitude distortions which adjust a magnitude of said input signal (pg. 323, col. 2, lines 35-38).

(6) With regard to claim 6, since the combiner is the signal path, some amount of distortion would inherently due to it.

(7) With regard to claim 10, Faulkner et al. also discloses a system according to claim 1 wherein said deliberate predistortion includes phase distortions which adjust a phase of said input signal (pg. 323, col. 2, lines 38-40).

(8) With regard to claim 11, Faulkner et al. also discloses a system according to claim 1 wherein said deliberate predistortion is based on at least one entry in a lookup table (pg. 323, col. 2, lines 35-40).

(9) With regard to claim 19, Faulkner et al. also discloses a system according to claim 11 wherein said deliberate predistortion is based on an interpolation of entries in said table (pg. 324, col. 2, lines 28-35).

6. Claims 12-15, 17-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Faulkner et al. (Adaptive Linearization Using Predistortion- Experimental Results).

(1) With regard to claim 12, Faulkner et al. discloses in Fig. 2, a method for processing an input signal (m) to produce a system output signal, the method comprising: receiving said input signal; applying a deliberate predistortion ( $H_R$ ,  $H_\theta$ , adapt) to said input signal to result in a predistorted signal; decomposing said predistorted signal into at least two components signals (RF section shows signal (m) decomposed into at least two component signals); each of the at least two component signals exhibiting a phase and a magnitude, the magnitude of at least two of the at least two component signals being substantially equal. Faulkner et al. teaches the Crisis network correcting for differential gain (magnitude) and differential phase (pg. 323, II. Adaptive Baseband Predistortion, lines 43-45). Thus, the correction of differential gain (magnitude) and phase would imply the signal components exhibiting a phase and magnitude and after correction, the magnitude (gain) of the two signal components would be substantially equal; separately processing each of said at least two component signals, wherein said processing further includes amplifying each of said at least two component signals (filter and amplifier, s; filter and amplifier c (pg. 324, col. 1, lines 1-2) and combining ( $\oplus$ ) said at least two components signals to produce said system output signal.

(2) With regard to claim 13, Faulkner et al. discloses a method according to claim 12 wherein said system output signal is an RF modulated version of said input signal (pg. 323, col. 2, line 46-pg. 324, col. 1, line 2).

(3) With regard to claim 14, Faulkner et al. also discloses a method according to claim 12 further including a processing step of separately processing each of said at least two component

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signals prior to step d). (Fig. 2 discloses at least two signal component processor blocks (filter and block s; filter and block c) for separately processing each of the two signal components before the step of combining.

(4) With regard to claim 15, Faulkner et al. also discloses a method according to claim 14 wherein said processing step includes amplifying at least one of said at least two component signals (pg. 323, col. 2, line 46-pg. 324, col. 1, line 2).

(5) With regard to claim 17, Faulkner et al. also discloses a method according to claim 12 wherein step a) further includes the step of accessing an entry in a lookup table, said deliberate predistortion being based on said entry (pg. 323, col. 2, lines 35-40).

(6) With regard to claim 18, Faulkner et al. also discloses a method according to claim 17 wherein said deliberate predistortion is based on an interpolation of entries in said table (pg. 324, col. 2, lines 28-25).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over by Faulkner et al. (Adaptive Linearization Using Predistortion- Experimental Results) as applied to claim 3 above, and further in view of Cox (Linear Amplification with Nonlinear Components).



As noted above, Faulkner et al. discloses all limitations of claim 4 above. Faulkner et al. does not teach the system of claim 3, wherein the amplifiers are non-linear amplifiers.

However, Cox teaches Fig. 1, a LINC amplifier for separating a signal into components wherein the amplifiers (G) are non-linear amplifiers (pg. 1942, col. 2, lines 10-11).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Cox for the amplifiers in the subsystem of Faulkner et al. because of their readily availability over linear amplifiers which would decrease cost of the system (pg. 1942, col. 1, lines 8-21).

9. Claims 7 and 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Faulkner et al. (Adaptive Linearization Using Predistortion- Experimental Results) as applied to claim 3 above, and further in view of Applicant's Admitted Prior Art.

(1) With regard to claim 7, as noted above, Faulkner et al discloses all limitations of claim 3. However, Faulkner et al. does not teach the system according to claim 3 wherein said amplifier is a switch mode amplifier. However Applicant's Admitted prior art teaches the Chireix amplifier subsystem wherein the amplifier is a switch mode amplifier (pg. 10, paragraph [00031]).

Therefore it would have been obvious to one skilled in the art at the time of invention to incorporate the use of a switch mode amplifier in the system of Faulkner et al. to provide low output impedances that allow for higher amplification efficiencies in the system.

(2) With regard to claim 8, Applicant's admitted prior art also teaches wherein the amplifier has a low output impedance (pg. 10, paragraph [00031]).

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Therefore it would have been obvious to one skilled in the art at the time of invention to incorporate the use of an amplifier with low output impedance in the system of Faulkner et al. to provide for higher amplification efficiencies in the system.

10. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Faulkner et al. (Adaptive Linearization Using Predistortion- Experimental Results) as applied to claim 14 above, and further in view of Gu (US Patent 6,737,914 A1).

As noted above, Faulkner et al. discloses all limitations of claim 14. Faulkner et al. does not explicitly teach wherein the processing step includes phase modulating at least one of said at least two component signals.

However, Gu teaches in Fig. 1, an amplifier subsystem wherein decomposed signal components are phase modulated (elements 104, 106).

Therefore it would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Gu to remove the effects of phase and gain mismatches in order to improve the accuracy of the combined signal components (col. 2, lines 16-51).

### ***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ghayour Mohammad can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

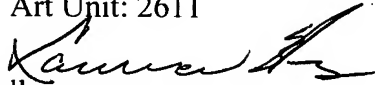
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Lawrence B. Williams

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lbw

May 16, 2007

  
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